Electronic Version
Stylesheet Version v1.1.1

Claims

[c1] What is claimed is:

1.A throttle calibration control configured to:
determine if throttle actuator position is within an idle position range;
if so, maintain the throttle actuator position as an idle position benchmark for subsequent engine operation until a subsequent throttle actuator positioning more idle than the idle position benchmark; and
establish a WOT position benchmark for subsequent engine operation based on a fixed angular position from the idle position benchmark.

[c2] 2.The control of claim 1 further configured to re-set engine control with each detected throttle actuator positioning more idle than the idle position benchmark.

[c3] 3.The control of claim 1 wherein the idle position range is defined by a set of throttle position actuator values within a deadband range of a throttle linkage connecting the throttle actuator to a throttle plate.

[c4] 4.The control of claim 3 wherein the fixed angular position is 94 degrees.

[c5] 5.The control of claim 4 further configured to determine actual throttle plate position during open throttle engine operation from feedback provided by a TPS connected to a throttle shaft designed to rotate the throttle plate between an open and closed position.

[c6] 6.The control of claim 1 further configured to:
determine throttle actuator position at engine startup; and
if the throttle actuator position is outside the idle position range, maintain engine idling independent of subsequent throttle actuator position until throttle position is detected in the idle position range.

[c7] 7.The control of claim 6 further comprised to require engine shutdown prior to allowance of a more open throttle position.

[c8] 8.The control of claim 1 further configured to re-set engine control with each detected throttle actuator position below the idle position benchmark independent of a previous detection of throttle actuator position within the idle position range.

[c9] 9.The control of claim 1 further configured to re-establish the WOT position with each actuator positioning below the idle position benchmark.

[c10] 10.The control of claim 1 further configured to measure a voltage drop induced by movement of a throttle actuator and measured by a TPS, and determine throttle actuator position based on a comparison of the voltage drop relative to a voltage at WOT.

[c11] 11.The control of claim 1 further configured to adjust at least one of fuel flow, ignition timing, and oil injection for subsequent engine operation based on at least the idle position benchmark.

[c12] 12.A control system for an internal combustion engine, the system comprising:
a TPS configured to provide an output indicative of actual throttle position; and
an ECU to control operation of an internal combustion engine, the ECU configured to set a new engine operation paradigm for subsequent engine operation with placement of a variable position throttle below a previous idle position benchmark.

[c13] 13.The control system of claim 12 wherein the TPS is operationally connected to a throttle shaft designed to rotationally position a throttle plate within an air intake and configured to provide an electrical signal to the ECU indicative of actual throttle plate position.

[c14] 14.The control system of claim 13 wherein the ECU is further configured to determine a percentage of throttle opening based on actual throttle position relative to WOT.

[c15] 15.The control system of claim 12 wherein the TPS is further configured to provide feedback indicative of a relative position of a throttle linkage connected to the variable position throttle independent of throttle plate opening.

[c16] 16.The control system of claim 12 wherein the previous idle position benchmark falls within a pre-set idle range defined by a range of non-zero, positive voltage outputs of the TPS.

[c17] 17.The control system of claim 16 wherein the ECU is further configured to:
receive an engine startup command;
determine an actual throttle position at engine startup; and
maintain engine at idling until throttle first positioned within pre-set idle range.

[c18] 18.The control system of claim 12 further comprising a volatile memory sized to permit storage of a single new idle throttle position value with each placement of the

variable position throttle below the previous idle position benchmark.

[c19] 19.The control system of claim 12 wherein the ECU is further configured to set a new engine operation paradigm at engine startup.

[c20] 20.The control system of claim 12 wherein the ECU is further configured to set the new idle engine operation paradigm to accommodate for variance in linkage(s) connected to the variable position throttle.

[c21] 21.An outboard motor comprising:
an internal combustion engine configured to propel a watercraft;
a throttle linkage connectable to a throttle and configured to control movement of a throttle shaft and throttle plate based on input received from the throttle;
a TPS connected to sense rotational position of the throttle shaft and translation of the throttle linkage, and configured to provide a first output indicative of throttle plate position relative to WOT during an open throttle plate condition and provide a second output indicative of throttle position during a closed throttle plate operation; and
an ECU configured to receive an input indicative of throttle position during closed throttle plate operation and

re-establish subsequent engine operation with positioning of the throttle in a predefined idle throttle position range.

[c22] 22.The outboard motor of claim 21 wherein the TPS is further configured to provide the second output based on a measured voltage difference resulting from movement of the throttle relative to WOT.

[c23] 23.The outboard motor of claim 21 wherein the ECU is further configured to re-establish engine operation with positioning of the throttle in the predefined idle throttle position range and in a more-idle position of a previous idle position basis.

[c24] 24.The outboard motor of claim 24 wherein the ECU is further configured to maintain engine operation initially after startup at engine idle independent of throttle plate position until the throttle is placed within the predefined idle throttle position range.

[c25] 25.The outboard motor of claim 21 wherein the ECU is further configured to re-establish a WOT position with positioning of the throttle in the predefined idle throttle position range and more-idle of a previous idle position basis as a fixed distance from a detected position of the throttle in the predefined throttle position range.

[c26] 26.The outboard motor of claim 25 wherein the fixed distance is 94 degrees of angular rotation.

[c27] 27.A method of throttle control calibration comprising the steps of:
determining if throttle actuator position is within an idle position range;
if so, maintaining the throttle actuator position as an idle position benchmark for subsequent engine operation until a subsequent throttle actuator positioning is in the idle position range and more toward idle than a previous idle position benchmark; and
establishing a WOT position benchmark for subsequent engine operation based on a fixed angular position from the idle position benchmark.

[c28] 28.The method of claim 27 further comprising the step of re-setting engine control with each detected throttle actuator positioning more idle than a previous idle position benchmark.

[c29] 29.The method of claim 27 wherein the idle position range is defined by an actual set of throttle position actuator values within a deadband range of a throttle linkage connecting the throttle actuator to a throttle plate.

[c30] 30.The method of claim 29 wherein the fixed angular

position is 94 degrees.

[c31] 31.The method of claim 30 further comprising the step of determining actual throttle plate position during open throttle engine operation from feedback provided by a TPS connected to a throttle shaft designed to rotate the throttle plate between an open and closed position.

[c32] 32.The method of claim 27 further comprising the steps of:
determining throttle actuator position at engine startup; and
if the throttle actuator position is outside the idle position range, maintaining engine idling independent of subsequent throttle actuator position until throttle position is detected in the idle position range.

[c33] 33.The method of claim 32 further comprising the step of requiring engine shutdown prior to allowance of a more open throttle position.

[c34] 34.The method of claim 27 further comprising the step of re-setting engine control with each detected throttle actuator position within the idle position range independent of a previous detection of throttle actuator position within the idle position range.

[c35] 35.The method of claim 27 further comprising the step

of re-establishing the WOT position with each actuator positioning in the idle position range..

[c36] 36.The method of claim 27 further comprising the step of measuring a voltage drop induced by movement of a throttle actuator and measured by a TPS, and determining throttle actuator position based on a comparison of the voltage drop relative to a voltage at WOT.

[c37] 37.The method of claim 27 further comprising the step of adjusting at least one of fuel flow, ignition timing, and oil injection for subsequent engine operation based on at least the idle position benchmark.